

4.6

Isosceles, Equilateral, and Right Triangles

- Goals**
- Use properties of isosceles and equilateral triangles.
 - Use properties of right triangles.

VOCABULARY

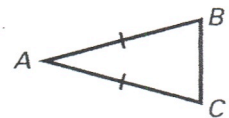
Base angles

Vertex angle

THEOREM 4.6: BASE ANGLES THEOREM

If two sides of a triangle are congruent, then the angles opposite them are congruent.

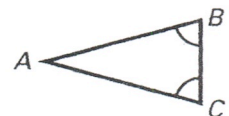
If $\overline{AB} \cong \overline{AC}$, then $\angle B \cong \angle C$.



THEOREM 4.7: CONVERSE OF THE BASE ANGLES THEOREM

If two angles of a triangle are congruent, then the sides opposite them are congruent.

If $\angle B \cong \angle C$, then $\overline{AB} \cong \overline{AC}$.



COROLLARY TO THEOREM 4.6

If a triangle is equilateral, then it is equiangular.

COROLLARY TO THEOREM 4.7

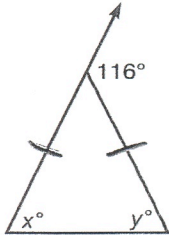
If a triangle is equiangular, then it is equilateral.

Practice

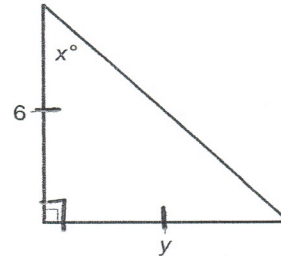
Isosceles Triangles

For each triangle, find the values of the variables.

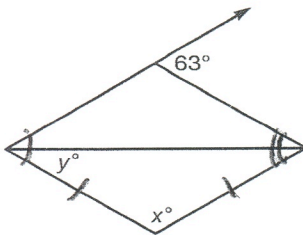
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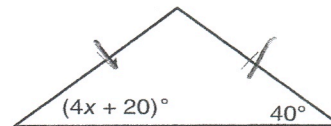
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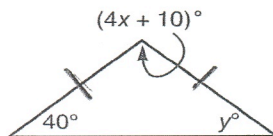
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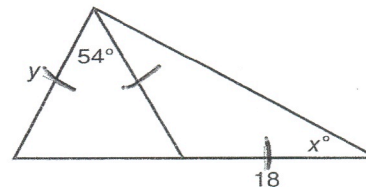
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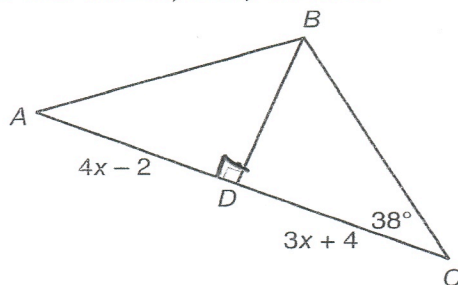
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6.



7. In $\triangle ABC$, $m\angle A = m\angle C$ and $m\angle C = 38$. Find $m\angle A$, AD , and AC .



8. In $\triangle JKL$, $\overline{JK} \cong \overline{KL}$. If $\angle J = 4x - 8$ and $\angle L = 3x + 15$, find $m\angle J$ and $m\angle L$.

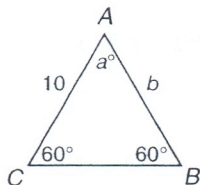


Skills Practice

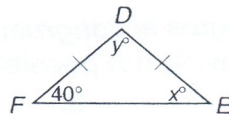
Isosceles Triangles

Find the values of the variables for each triangle.

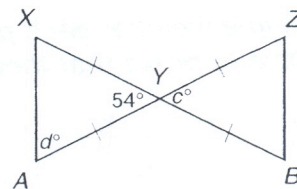
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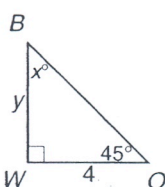
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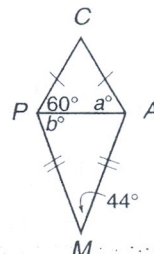
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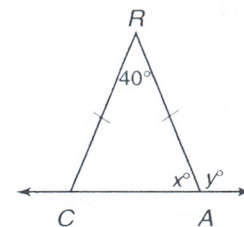
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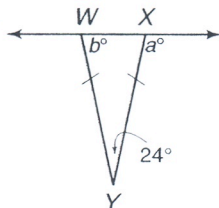
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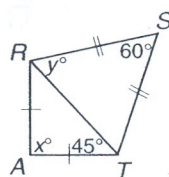
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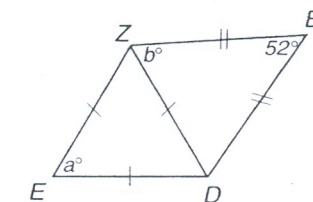
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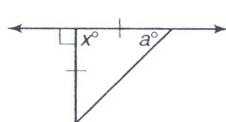
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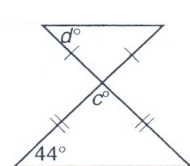
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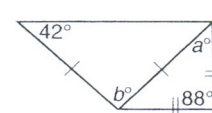
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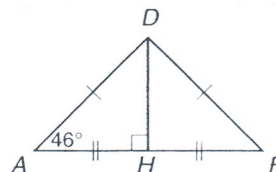
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12.



Use the figure at the right.

13. In $\triangle ADF$, if $AD = x + 6$ and $DF = 3x - 10$, what is AD ?14. In $\triangle ADH$, if $m\angle ADH = 2x - 4$, find the value of x .15. If $AH = 5x - 1$ and $FH = 3x + 21$, what is AH ?16. In $\triangle ADF$, what is $m\angle ADF$?

Study Guide

Isosceles Triangles

Remember that two sides of an isosceles triangle are congruent. Two important theorems about isosceles triangles are as follows.

If two sides of a triangle are congruent, then the angles opposite those sides are congruent.

If two angles of a triangle are congruent, then the sides opposite those angles are congruent.

Example: Find the value of x .

Since $\overline{AB} \cong \overline{BC}$, the angles opposite \overline{AB} and \overline{BC} are congruent. So $m\angle A = m\angle C$.

Therefore, $3x - 10 = 2x + 6$.

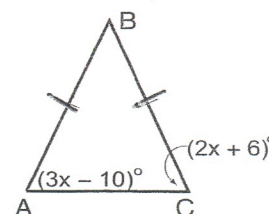
$$3x - 10 = 2x + 6$$

$$3x - 10 + 10 = 2x + 6 + 10 \quad \text{Add 10 to each side.}$$

$$3x = 2x + 16$$

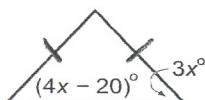
$$3x - 2x = 2x + 16 - 2x \quad \text{Subtract 2x from each side.}$$

$$x = 16$$

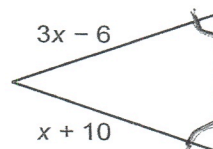


Find the value of x .

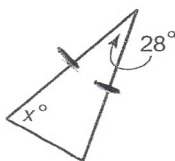
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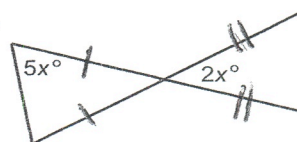
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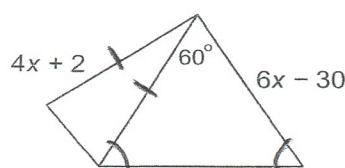
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